

STUDIES IN FRUIT DISEASES

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BLACK KNOT OF PLUMS

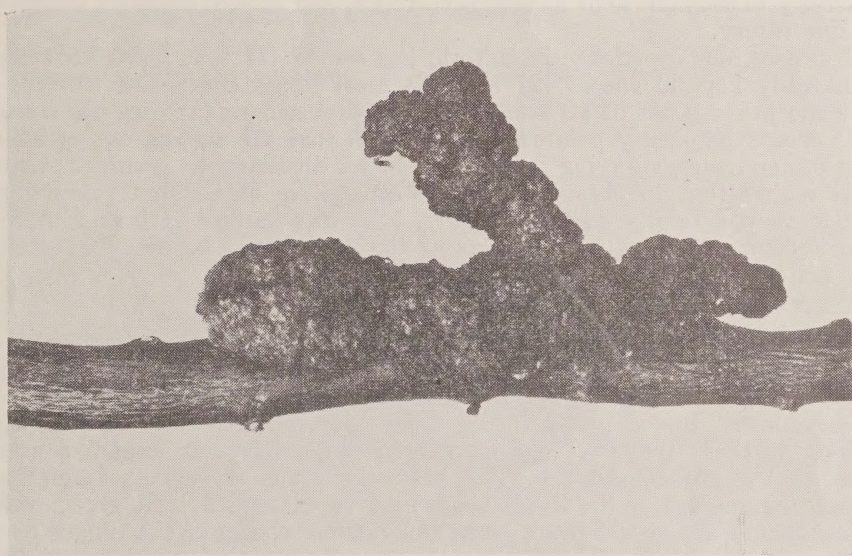
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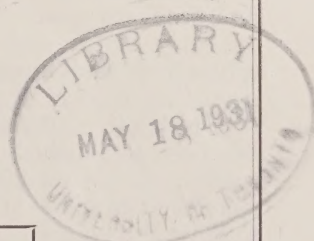


BLACK KNOT ON PLUM. (PHOTO BY L. W. KOCH)

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# BLACK KNOT OF PLUMS

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Black knot of plums is undoubtedly the most serious disease affecting plums. It also attacks cherries, but is by no means as severe on cherries as it is on plums. In New Brunswick and Prince Edward Island black knot has been responsible for a great reduction in the acreage of plums. In British Columbia plums are of no economic importance, and as a result black knot is unimportant there. In Ontario and Nova Scotia, where plums are grown extensively black knot is of annual occurrence, and in some seasons causes considerable injury.

However, our experience in Ontario has shown (1) that black knot can be economically kept in check, (2) that the most important means towards this end is the pruning out of all knots, and (3) that a dormant spray is essential.

It should be clearly pointed out, however, that the cutting out of knots is the prime essential, spraying being more of an auxiliary to pruning. Growers should realize that to obtain success in controlling black knot pruning must be done very carefully and thoroughly, otherwise failure is bound to result. When it comes to spraying, all parts of the tree should be drenched with the spray material.

## SYMPTOM

The characteristic symptom is the black knot or gall (Frontispiece) found on twigs and branches. The knots are first found as swellings in late fall, or, more commonly in early spring. As growth continues, the swellings crack open and a yellowish-brown granular substance fills the crevices. As the season develops further, the swellings increase and the irregular knot-like growths become more pronounced. Shortly after the granular substance referred to appears, the surface of the knots becomes covered with a light green, velvety pile, on the surface of which are borne the summer spores of the fungus causing this disease. Towards fall the knots become dark in colour and go into the winter condition perfectly black. In the following spring a different spore form, the so-called winter spore is disseminated, which initiates the disease that season and produces more swellings and new knots. In other words, spores are given off early in the spring (winter spores) and well into the summer (summer spores), so that infection may take place over a long period of time. When spores light on a tender branch and find moisture and temperature conditions favourable to germination and growth, infection may take place. Once infection has been established, the fungus develops and grows, until finally a black knot results. It should also be pointed out that not only are new knots developed from the two kinds of spores referred to, but that the old knots as well, continue to grow and enlarge until in some cases they become over a foot in length. Some of these large ones are the final result of two or more growing together.

## CAUSE

Black knot is caused by a very minute, microscopic form of plant life known as a fungus, to which the name *Dibotryon morbosum* (Schw.) Theiss. & Syd. has been given. Though the time and manner of infection of host plant tissues is as yet imperfectly known, the resultant of infection—black knot—



has been long established. The black knot fungus over-winters in the knot structure where it forms during the winter, numerous receptacles in which the ascospores, or winter spores, are produced. These are disseminated very early in the spring. In late spring or early summer the first crop of the so-called summer spores is produced. Though quite different from the asco, or winter spores, they serve the same purpose, namely, that of causing new infections.

### CONTROL

The control measures recommended are based upon the following facts in the life history of the black knot fungus.

(1) The fungus is perennial in diseased branches and extends beyond the apparent limits of the knots (fig. 1).

(2) The winter spores, or ascospores, mature early in the spring just before growth starts.

(3) The summer spores of the fungus are mature and ready for infection when the young knot shows a velvety-olive-green pile.

(4) The brush-pile of knot cuttings will produce black knot spores.

(5) The spores are wind-borne.

In consequence, the following control measures are recommended.

(1) **PRUNING.**—Orchards should be pruned at least twice in the season. The first pruning should be done by February or early March before the winter

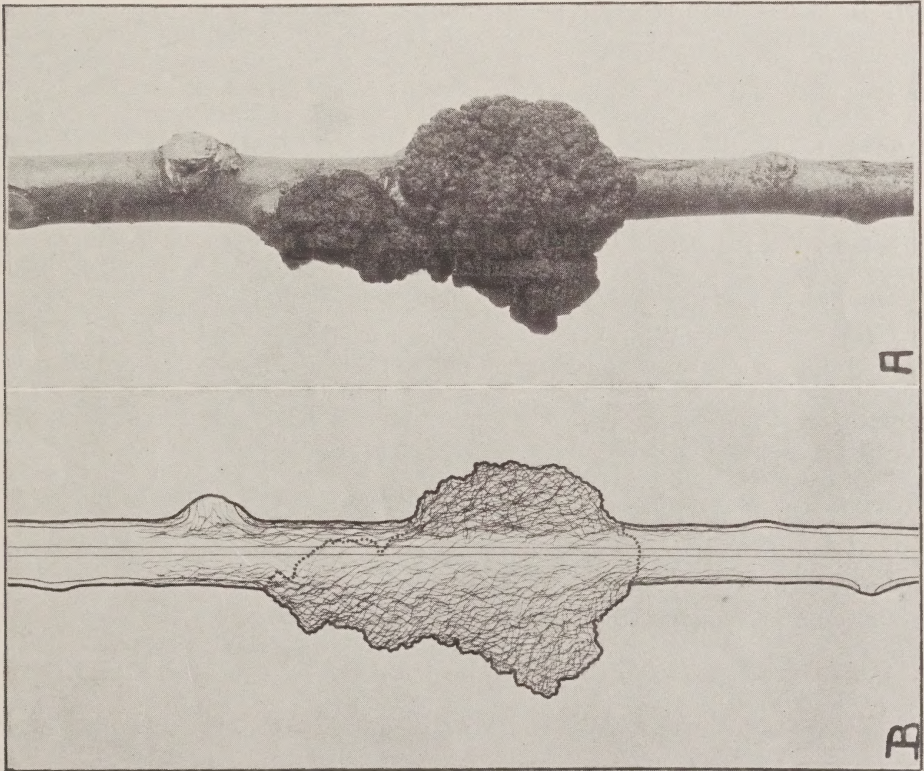


Fig. 1: (a) Black knot almost girdling plum branch.  
 (b) Diagrammatic drawing of same knot, showing mycelium (thread-like strands) of the black knot fungus extending beyond the margin of the knot. If any of this mycelium is left in the branch after pruning, it will continue to grow and produce new knots. Hence the necessity of cutting well beyond the external limitations of the knot.  
 (Photos by J. K. Richardson).



spores of the fungus are mature. At this time the black knots are very conspicuous and can be easily cut out. It is essential, however, that the pruning be done early because data obtained at this laboratory during the past three years demonstrate that winter spores mature in February, ready to cause infection when moisture and temperature conditions are favourable. The second pruning should be done in May or early June when the knots are yellow-brown in colour and before the summer spores are mature. When this is the case knots take on a light green colour and from the standpoint of control it is essential that summer pruning be done before the spores are mature. Therefore, endeavour to do summer pruning for black knot when the knots are yellowish-brown in colour, which, in Ontario, will be in May, or early June.

In cutting out knots, cut back at least four to five inches beyond the external limitation of the knot. The necessity for this is apparent by referring to fig. 1 which shows that the infection of the black knot fungus extends some distance beyond the actual knot. Failure to do this means failure in controlling black knot.

(2) **SPRAYING.**—Although cutting out of knots is the first essential in control, the dormant spray as a further aid to satisfactory control is of great importance. This spray should be lime sulphur—one gallon of commercial lime sulphur to seven gallons of water—and should be applied before the buds burst. The full strength dormant spray is advised because in addition to black knot control, it acts as a general clean-up against insect pests as well as disease germs. If European red mite or Lecanium scale is also to be controlled, Bordeaux oil emulsion is preferable to the lime sulphur. This is a 3 per cent oil emulsion with 3.6.40 Bordeaux. It is also advisable to make additional applications of summer strength lime sulphur—one gallon of commercial lime sulphur to forty gallons of water—at shucks time and again two weeks later. These summer applications aid in reducing infection from the summer spores of the fungus.

(3) **BURN PRUNINGS.**—Experimental evidence has demonstrated that knots left in a brush pile are still capable of maturing their spores and effecting spread of black knot. It is therefore essential that all prunings be destroyed by fire as soon as possible after pruning has been completed.

(4) **SPORES ARE WIND-BORNE.**—It is also well to remember that the spores of this disease are carried by the wind and therefore, if there are any wild plums, or cultivated but neglected orchards in the vicinity, it is only to be expected that control will be considerably more difficult due to constant wind-blown infections. It is therefore advisable to cut and destroy all wild plum trees from the vicinity of commercial plum or cherry orchards. In districts where this disease is very severe a community effort is essential in order to effect control of the disease. If a district as a whole is severely infected with black knot, it is extremely difficult for an individual grower to keep his orchard clean while nearby orchards are diseased.

Studies in Fruit Diseases previously issued:—

- I. Tomato Diseases, by G. H. Berkeley, (Bulletin No. 51, New Series, Revised Edition).
- II. Diseases of Plums and their Control, by G. H. Berkeley, (Pamphlet No. 119, New Series).
- III. Diseases of the Raspberry, by G. H. Berkeley, (Pamphlet No. 120, New Series).
- IV. Perennial Apple Tree Canker, by H. T. Güssow, (Pamphlet No. 116, New Series).